

SCIENCE AND INVENTION.

Work of the World's Busy Brains in Discovering, Inventing and Creating.

NIAGARA AS A SOURCE OF POWER.

The drainage from 90,000 square miles is contracted into a narrow channel in the Niagara River, and leaps downward 165 feet. This means a wall of water 20 feet deep continually rushing over the falls. It represents about 7,000,000 horse-power, or equal to 2,000,000 tons of coal burned every 24 hours. The first effort to make this immense power available was in 1842, when a company built a canal 35 feet wide, eight feet deep and 4,400 feet long which gave about 10,000 horse-power. The present development dates from 1885, when Mr. Thomas Evershed, a very able engineer, who was employed by the State of New York on some work around the falls, developed the plan of utilizing the power to a much greater extent than had heretofore been attempted. He labored with capitalists for three years before he could secure funds, and finally getting them interested procured a special charter giving the right to take water enough to develop 200,000 horse-power. This company got another concession on the Canadian side for 250,000 horse-power. Mr. Evershed's plan was adopted and involved a service canal 250 feet wide from a point on the Niagara River one and a half miles above the falls and extending inwardly 1,700 feet. In carrying this plan out more than 1,000 men were at work for three years, with a much larger number at intervals. They removed 300,000 tons of rock and used 16,000,000 brick for lining.

The enterprise has developed an importance which its originators hardly anticipated. Buffalo, the Tonawandas, Lockport and Niagara Falls are dependent upon this canal, and 50 large manufacturing plants representing a capital of \$100,000,000 also obtain their power from it, as do 5,000 miles of street-car tracks. The power is exceeding cheap, and can be furnished night and day from one year's end to another at a rate of \$8 per horse-power. The application of the force is constantly extending, and the Pittsburgh Reduction Co., which controls the aluminum industry of the world, left Pittsburgh, where they could buy coal for 68 cents a ton, and moved to Niagara, expecting to save from the use of electricity to pay the cost of removal inside of a year. The ovens in the big factory of the Natural Food Co. are heated by electricity, and these are only isolated instances of the various uses of the power.

PLATINUM IN THE UNITED STATES.

The rapidly increasing demand for platinum for use in electrical work and otherwise has stimulated the Geological Survey to efforts to discover sources of supply in the United States. At present nine-tenths of the platinum used comes from Russia, but it has seemed that with all our mineral wealth we should have a supply within our own borders. Platinum is frequently found in the mines, but in such small quantities that the miners have paid little attention to it. The high price which it now commands will probably stimulate them to greater care in collecting it. It usually occurs in black sand which accompanies a deposit of other metal, and last March a circular was sent out to miners operating in which this black sand occurs, asking them to send samples to the Geological Survey for analysis. From 8,000 requests sent out 828 samples were received, coming from nearly every State in the country, British Columbia, Alaska and Cuba. These have been examined and several of them have shown very hopeful indications. There was a trace of platinum in many of them. The following table shows the more promising mines. The figures give the ounces per ton of black sand. As platinum is now much more valuable than gold, it will be seen that many of these deposits can be worked with great profit:

California.	Gold.	Platinum.
Oroville, Butte	19.94	27.45
Orinda, Humboldt	19.90	4.00
Taylor Mine, North Fork		
American River, Colfax		
Placer	29.26	1.27
Gold mine of Auburn		
Placer	24.14	1.48
Gold Run, Placer	37.61	8.78
Gold Blossom Mine		
Butcher Ranch Mining District, Placer	191.60	3.36
American River, Placer	126.90	9.47
Junction City Mining District, Trinity	28.43	25.80
S. Fork and Trinity River, Trinity	9.62	1.28
T. S. N. R. Trinity	4.30	4.61
Oregon.		
Old Ocean Beach, Randolph Mining District		
No. 1, Coos	1.8	2.10
Ocean Beach, Coos	1.25	6.23
East of Riddle, Douglas	4.71	8.59
Riddle, Douglas	19.27	128.73
Cow Creek Mining District, Glendale, Douglas		
Fry Gulch Mine, Josephine	.50	2.25
South Santiam River, Linn	2.60	3.52

CATCHING DISEASE IN CARS.

A great deal of groundless alarm has been worked up by poorly-informed writers as to the probability of catching contagious diseases, and particularly consumption, from traveling in railroad cars, sleeping, and day-coaches. These writers have claimed that tuberculosis is contracted from the sputum of those afflicted with the disease becoming dry and floating in the air. Dr. Charles B. Dudley, chemist of the Pennsylvania Railroad, has been making an exhaustive examination of these possibilities of disease and sums up decidedly against them in an address which he read before the American Public Health Association. In the first place he says that consumption is difficult to catch and requires a very long exposure before its communication. Next, the sputum is extremely difficult to dry, and when dry is with difficulty pulverized. When dry and pulverized it is so heavy that it readily falls to the ground and two days of strong light or five days of diffused light will effectively sterilize it. The statistics show that railroad employees suffer far less from consumption than the average community. The Pullman Company has no statistics, but its com-

cers say that they have never known of either a conductor or a porter to acquire any disease except one case of smallpox. None of the oldest conductors can recall a porter who had consumption. The records of the Pennsylvania Company's relief fund very strongly support these claims.

Ten years ago the English makers furnished nearly all the bicycles to Switzerland, but they have been displaced by German makers, who last year sold 49,500 wheels to Switzerland, 12,500 French, 6,000 American and 1,700 English. The Swiss get nearly all their bicycle fittings, such as keys, bells, lanterns, etc., from Germany.

A French engineer has developed a machine which turns out continuously sheets of glass 39 1/2 inches wide, of any desired length and of uniform thickness. It can be made of any thickness from 1-15 to 5-16 of an inch. It is superior to hand-made glass in being equally bright on both sides.

Work of the Patent Office.
For the week ended Oct. 31, 1905, the Patent Office issued 575 patents, 41 designs, 276 trade-marks, 31 labels, nine prints and two re-issues, making a total of 934, of which 569 patents and 314 trade-marks went to citizens of the United States and 47 patents and two trade-marks to those of foreign countries.

To Assist the Hearing.
John R. Gault, Montooth, Pa., has patented what he terms a microcouscous, or an instrument to assist the hearing, consisting of a thin disk of soft flexible

metal folded and secured in a conical form, whereby a conical passage is formed through the same. This is thrust into the ear to give it greater sensitiveness to sound.

Nut Lock.
Jacob T. Smith, Dublin, Va., has patented an entirely new form of a nut lock which has a heavy steel link bent

so as to engage the end of the bolt and the corner of the nut and hold them firmly.

Wrench.
Frederick Zwicker, Indianapolis, Ind., has patented a wrench which has some novel features for ready adjustment.

Current Water Wheel.
John L. Weaver, Boise, Idaho, has patented a current water-wheel which is a fixed hollow column supporting a

float platform, on which is a water-wheel with floats engaging the current on one side and automatically lifting above it as the wheel turns around.

Hoe.
William A. Sparks, Parkersburg, W. Va., has patented a hoe with the blade formed of a single piece of metal bent

and riveted to the upper surface of the handle. A lip cut from the piece of metal engages the lower surface of the handle and thus gives a firm attachment.

Combination Tool.
William Scott, Jr., Nyack, N. Y., has patented a tool which comprises a hammer, a nipper, a pipe wrench, a nail puller, a piler and a wire cutter.

Fish Bait.
Jay B. Rhodes, Kalamazoo, Mich., has patented an artificial bait or lure for fishing which consists of an imitation

fish with a slot in its rear end and an adjustment of springs to keep the legs in motion and attract the fish to the hooks which are fastened to the sides.

Gold From Sea Water.
Consol Mahn writes from Nottingham, England, that the Belgian process has been found successful in securing gold from sea water. He says: "The assumed practicability of extracting gold from sea water has been strengthened by a process lately patented in Belgium, described as follows: A ton of sea water is treated with about five cubic centimeters of concentrated aqueous stannous chloride

forced economy—which is alike his recompense, affording him, in forestry, a healthful science for his brain and a wholesome labor for his body. Veneers are manufactured in two ways, by sawing and by planing. With knives, sawed veneers are so expensive, however, that the demand for them is small. Nearly the thickness of the veneer is lost in sawing, and on an average, a saw can make only five cuts before refiling is necessary, an operation requiring two and a half hours. Where the wood is very gritty only one cut can be made before refiling the saw. Planes often remain on the saw three weeks before all sawn up. The only advantage of the sawed veneer is that longer stock can be used in the sawing machine than in the planing machine.

It is the knife-cut veneer, however, that has brought the industry to its present enormous proportions. The method of manufacture is so perfect and so economical that the demand for the product is greatly in excess of the supply. Furniture manufacturers use millions of feet of veneer every month; car builders use fancy veneers for ceiling and finishing; banks, offices, hotels, stores, churches, public buildings and homes use this finish, and beside these there are many other uses. The veneer barrel manufacture, all large consumers. A single veneer cutting machine can cut a barrel of veneer in 10 hours, and still the demand exceeds the supply. Any kind of lumber will make good cut veneers, but the most common is the white pine and all our native timbers can be worked in any thickness up to the practical limit of about a half inch.

In veneering, the log is cut for cutting. It is first sawed up in lengths suitable for the machine to handle, its surfaces freed of bark, and it is then either steamed or boiled in a vat. Logs can be cut cold, but better results are obtained by heating, which softens the wood, renders it flexible, drives out the sap so that less time is required for drying, and overcomes any disposition to check or split. Boiling is preferable to steaming, as the heating is even throughout and the logs remain in cutting condition for several hours, whereas after steaming they must be cut immediately, for, once cool, they become brittle and hard and can never be put in good cutting condition again. From the boiling vat the log is carried by the veneer cutter by a log trolley consisting of an I-beam track provided with a carriage and a chain hand hoist for raising and lowering the log.

The rotary cutting machine has an A-frame, giving it a broad base; the log is held in the machine by dogging spindles, operated either by hand or power. The knife is attached to a head block and is firmly clamped between heavy castings, which cover both its sides up to the necessary clearance from log and stock. Its pitch can be changed instantly to suit the wood being cut by merely shifting a lever. This is very important, as timber varies in its characteristics as to grain, structure, hardness, density, etc., and the rule can be made for setting the knife. Practical machines up to 10 feet in length are built along these lines.

Veneers cut from figured woods, such as mahogany, walnut, ash, chestnut, cedar and quartered oak bring the highest prices. For cutting these fine woods the machine is furnished with a stay-log device, consisting of an arm or offset chuck for each spindle connected by a heavy cast iron bar incapable of spring under any knife pressure, with three-quarter inch holes, drilled in its ends at intervals of every three feet to which the fit is securely bolted by special log screws. Suppose quartered oak is to be cut. The log is first sawed into quarters, and a small piece is cut from each outer corner of each quarter to accommodate the chucks of the stay-log attachment. Then along the side of the fifth five-eighths-inch hole at intervals of every three feet the stay-log are bored. The fit is then bolted to the stay-log and the machine is ready to set in motion. Each revolution of the log causes the chucks in contact with the knife, cutting any desired thickness and producing the proper quartered effect. Any length of knife up to 120 inches may be used in such a machine, while the width of these machines ranges from 20,000 to 32,000 pounds.

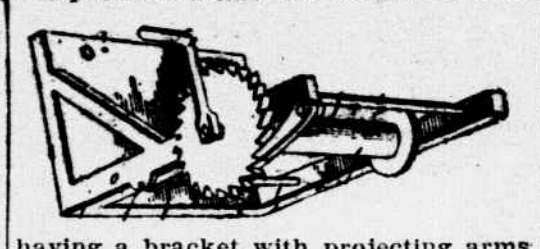
The veneer comes from the veneer machine in continuous sheets and its quality and purpose determine its future treatment. Usually it is divided into widths by one of the several types of veneer clippers. From the clipping machine the neat piles of material are conveyed to the drier. For soft wood veneers, usually a mechanical wringer is provided which extracts from 25 to 50 per cent of moisture from the stock, reducing the cost of drying.

The modern drying machine consists of a series of iron rollers incased in an iron box of the length and breadth required for the stock. The iron rollers are geared to and driven by a shaft running the full length of the box. The shaft is driven by an independent engine. A hot steam or fan driven by engine is used in connection. The veneer is fed in at one end of the drier by a boy and comes out at the other by a free conveyor which wrinkles or splits and with its surface partially polished, and is then ready to ship. The drier can be instantly adjusted to dry any kind or thickness of veneer and will handle the thickest of veneers, one-third of an inch thick can be dried perfectly in 45 minutes.

With this perfected process of manufacture and the growing scarcity of lumber, the veneer industry is becoming so profitable that many sawmill owners all over the country are adding a veneer cutting department, realizing that while there will always be the natural demand for sawed lumber, the uses for thin lumber are daily increasing.

Clothes-Line Reel.

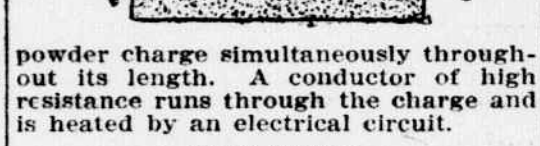
George F. Keating, Bloomington, Ill., has patented a line reel for clothes lines



having a bracket with projecting arms, a crank shaft holding a spool and a ratchet for winding up the line and holding it taut.

Firing a Powder Charge.

Francis I. Dupont, Wilmington, Del., has patented a method of firing a



powder charge simultaneously through-out its length. A conductor of high resistance runs through the charge and is heated by an electrical circuit.

Fruit Picker.

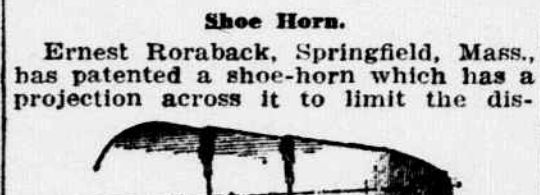
Cornelius B. Hyson, Everett, Wash., has patented a fruit picker which consists of a ring upon a long handle with projections around the inner side to



pull the fruit, which drops into a long sack opened at the lower end. The sack is supported from the handle by an adjustable cord to prevent the fruit falling any distance and becoming bruised.

Shoe Horn.

Ernest Roraback, Springfield, Mass., has patented a shoe-horn which has a projection across it to limit the dis-



tance the horn shall enter the shoe; a second projection above it and a notch at the heel forming a hook to make a lacing pick-up.

Wrench.

Arthur L. Bennett, Morgantown, W. Va., has entered the numerous band of wrench inventors by one which has the



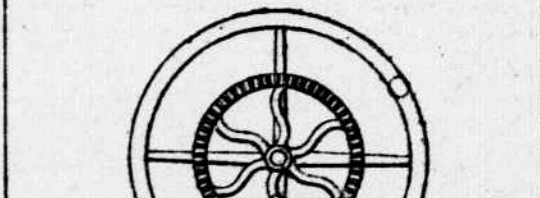
usual stationary jaw and shank with a movable jaw connecting with ratchet teeth in the handle which engage other ratchet teeth and is operated by a spring yielding to the pressure of the hand.

Split Pulley.
William R. Patten, New York, N. Y., has patented a split pulley composed of a plurality of sections which are held



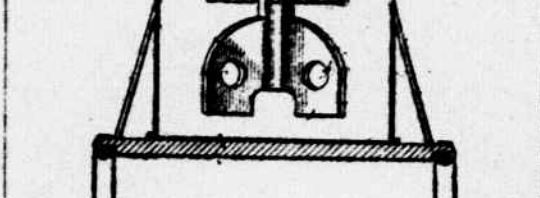
together by a square bent bolt so adjusted as to enable the pulley to be readily tightened upon the shaft and held firmly.

Churn.
William A. Carpenter, Attica, O., has patented a churn with a peculiar dash-



er operated by a beveled wheel above the churn.

Miles E. Garwood, Birmingham, Mich., has patented a tool which has a nut or



mer, a nipper, a pipe wrench, a nail puller, a piler and a wire cutter.

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fish with a slot in its rear end and an adjustment of springs to keep the legs in motion and attract the fish to the hooks which are fastened to the sides.

pipe wrench on one side and a monkey wrench on the other.

MANUFACTURE OF VENEERS.

Rich Effects Obtained—Scarcely a Square Inch of Waste—Methods of Cutting and Drying—Used for Fine Work.

(Popular Mechanics.)

Veneer is no longer a term of deception, for today the finest doors, pianos, furniture, floors and ceilings are veneered. The province of the veneer machine is to make a single log of mahogany, for instance, cover as much space as otherwise the logs would require to do. The work of converting the solid log into a long strip no thicker than pasteboard, and which can be rolled up like carpet, is an interesting one.

The process by which huge logs or "fitches," ranging in value up to \$5,000 apiece, are reduced to thin sheets sufficient to cover a room and not made feet of surface, with hardly a square inch of waste, is of unique importance in this age. The time has passed when man may reap the forests with a wanton hand. His improvidence has brought upon him its penalty—enforced economy—which is alike his recompense, affording him, in forestry, a healthful science for his brain and a wholesome labor for his body.

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Gold From Sea Water.
Consol Mahn writes from Nottingham, England, that the Belgian process has been found successful in securing gold from sea water. He says: "The assumed practicability of extracting gold from sea water has been strengthened by a process lately patented in Belgium, described as follows: A ton of sea water is treated with about five cubic centimeters of concentrated aqueous stannous chloride

ride, when the gold is converted into purple of Cassius and precipitated to the bottom with magnesium hydrate and the excess of tin, by the subsequent addition of about a pound of slacked lime. From this precipitate the gold is extracted with dilute potassium cyanide solution and isolated by any of the methods commonly used in the cyanide process (e. g., precipitation with zinc). Sea water from the Mediterranean and the English Channel yielded no gold by this process, whereas samples from the Atlantic furnished traces.

A CONCRETE ROADBED.

A Proposed Improvement for High Speed and Frequent Trains.

At a recent meeting of the Convention of Railroad Track-Masters it was stated that the roadbed had not made anything like the development that had been attained in other parts of railroad building. It remains very much as it has been for a half-century—simply the rails spiked to ties held in place by ballast. There has not been much

advocacy of any better form, though the inadequacy of the present system is strongly apparent and becomes more so with every increase in speed and weight of trains. A plan is now proposed for a concrete roadbed, which can be used to advantage upon main lines, where the number of trains passing over in a day is quite great and the rate of speed very high. Such, for example, as the lines between New York and Boston, between New York and Washington, between New York and Buffalo, between Cincinnati and Chicago, and between Chicago and St. Louis.

The proposition is, first, that the roadbed should have been long in use and well settled, that it must be well-drained. The first thing is to build a sub-structure of rubble concrete. This bed of rubble is to be made level with a bed of mortar, upon which concrete floor is to be placed in sections. After it is all set longitudinal timbers are laid on and upon these the track rails. Such a floor, if properly constructed, would require no renewal except the timber upon which the track rails rest.

A detailed estimate placed its cost per mile at \$14,000; while the usual form of track was estimated at \$8,000 a mile, a difference of \$6,000. Assuming a yearly maintenance cost for present track to be \$200 a mile greater than for the permanent track (on the basis of one mile more per mile of track at \$1.25 a day), and balancing against this difference in maintenance cost the interest at 4 per cent on the difference in first cost, the result was a saving of \$180 a mile a year, making the total saving per mile per year \$20. Careful these speculations still further, estimates were made on the saving of fuel and of repairs to rolling stock, which worked out at \$185 a mile, bringing the total up to \$385 per mile per year.

AUTOMOBILES FOR COUNTRY.

An Important Feature for Ohio Farmers.

Though the State of Ohio is covered with a network of steam and electric roads, the more facilities for travel that the people have the more they seem to want, and the more profitable become the lines of communication. A

new enterprise is now attracting much attention. It is a revival of the old stage-coach idea with a motor car for the vehicle. The first line has been put in operation from Springfield to Jamestown, 22 miles distance, and passes through two other towns with a population of 42,500. The roads are fairly good, but the motor people offer to pay \$100 a mile per year for the maintenance and improvement if the local authorities will

do the same. Two cars are already in service, with one in reserve, and make the run of 22 miles in one hour and 45 minutes. A fare of two and a half cents a mile is charged, or 50 cents for a full day's ride. The cars will accommodate 14 passengers and are driven by 18-horse-power gasoline engines at the average speed of 15 miles an hour. The present test has been so successful that it has been decided to extend the line 25 miles farther to Marysville. The experiment, which is attracting attention all over the country, is being carried out at a cost of less than the trolley cars and there are no highly-expensive power houses, trolley lines and tracks to keep in order. The motor age makes the computation of the probable expense and profits of the venture:

"From present running the cost of operation can be fairly well calculated. In a round trip of 44 miles four and a half to five gallons of gasoline are consumed and two and a half pints of lubricating oil. The former costs 10 1/2 cents per gallon and the latter 60 cents per gallon, making the allowance for each round trip 57 cents. The operator is paid 25 cents an hour, and as two hours are required for the round trip amounts to \$2.25. The company is allowing two cents per car mile for repair and depreciation. The two machines make together 220 miles each day or 66,000 miles per year, 365 days, so that yearly the company will allow amounts to \$1,320, which, taken with the annual fuel bill, gives a grand total of \$3,572.

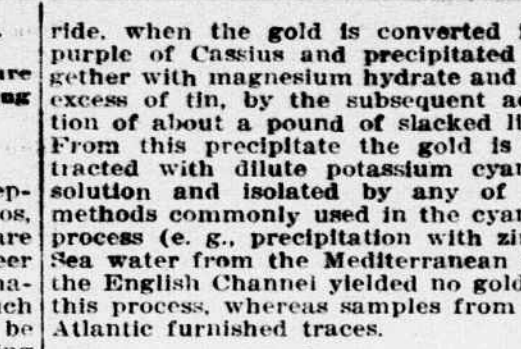
"The three machines cost \$6,600, an extra sum of \$1,000 was spent in fixing up a garage and repair shop, and \$1,000 was spent on highway repair. On this investment five per cent interest must be placed, which adds \$330 to the total of \$3,572 already reached, making in all \$4,002 expenses for the first year.

"Where are the receipts to cover this expenditure to come from? The company will the company have a revenue at the end of the year? Supposing that only one passenger was carried throughout the entire year, the receipts of \$2.25 per trip would give a revenue of \$1,320. Two passengers carried all of the time would be an annual revenue of \$3,300 and four passengers would yield yearly receipts of \$6,600. Take from this sum the operating expenses, \$4,002, and there remains \$2,598 as a dividend on the \$20,000 stock. The company is divided on the \$20,000 stock would only amount to \$1,000, so there remains a margin of \$597 for some things that are sure to lighten the coffers of the concern."

THE EGYPTIAN FAMINE.

An Important Monument Found Corroborating the Biblical Account.

Among the most important of the finds about the great city of Thebes or Luxor, in Egypt, is a great rock on the island of Sehel below the first cataract. This, which is represented by the illustration, has the hieroglyphics



Half Section in Cut. Half Section in Fill.

CONCRETE R. R. CONSTRUCTION.

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